SECTION 23 21 14
GROUND-LOOP HEAT-PUMP PIPING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Ground source water piping to connect HVAC equipment: This Section includes piping for vertical, direct-buried, ground-loop, heat-pump systems.

1.2 RELATED WORK

A. Section 01 00 00, GENERAL REQUIREMENTS.

B. Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

C. Section 13 05 41, SEISMIC RESTRAINT REQUIREMENTS FOR NON-STRUCTURAL COMPONENTS: Seismic restraints for piping.

D. Section 23 05 11, COMMON WORK RESULTS FOR HVAC: General mechanical requirements and items, which are common to more than one section of Division 23.

E. Section 23 07 11, HVAC AND PLUMBING INSULATION: Piping insulation.

F. Section 23 23 00, REFRIGERANT PIPING: Refrigerant piping and refrigerants.

1.3 QUALITY ASSURANCE

A. Section 23 05 11, COMMON WORK RESULTS FOR HVAC, which includes welding qualifications.

B. Installer shall be a direct geo-exchange manufacturer’s approved installer with 5 years of geothermal loop experience.

C. Geo-exchange system is a manufactured system. The system provided by the manufacturer, includes the manifold, piping and heat pumps. Consult with manufacturer for all relevant details.

1.4 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Manufacturer's Literature and Data:

1. Pipe and tubing, with specification, class or type, and schedule.
2. Pipe fittings, including miscellaneous adapters and special fittings.

C. As-Built Piping Diagrams: Provide drawing as follows for ground source heat pump piping.

1. One wall-mounted stick file with complete set of prints.
2. One complete set of reproducible drawings.
3. One complete set of drawings in electronic pdf format.

PART 2 - PRODUCTS

2.1 BOREHOLE BACKFILL

A. Surface Seal: Cement with manufacturer's recommended grout.

B. Backfill below Surface Seal with natural or manufactured sand.

PART 3 - EXECUTION

3.1 GENERAL

A. Excavating, trenching, warning tape, and backfilling are specified in Section 31 20 00 EARTH MOVING.

3.2 VERTICAL PIPING INSTALLATION

A. Install piping in boreholes according to ASTM D 2774 or ASTM F 645.

B. Purge, flush, and pressure test piping before backfilling boreholes.

C. After installation of loop pipe in borehole, fill piping loop with refrigerant, and pump backfill into borehole to discharge at base of borehole.

D. Fill borehole with backfill to a point at least 60 inches (1524 mm) below grade and backfill remainder with surface seal material.

E. Extend piping and connect to geo-exchange, ground-loop, heat-pump piping systems in locations and pipe sizes indicated on the plans.

F. Provide manifolds per manufacturer's recommendation. Install piping at depths directed by the manufacturer. Spacing between vertical bores and manifolds to be per manufacturer's direction.

G. Wall sleeves are specified in Section 23 05 11 COMMON WORK RESULTS FOR HVAC.

3.3 REFRIGERANT FILL

A. Fill system with required quantity of R-410A.

3.4 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

3.5 FIELD QUALITY CONTROL

A. Piping Tests: Fill piping 24 hours before testing and apply test pressure to stabilize piping.

B. Hydrostatic Tests: Test at not less than 1-1/2 times the pipe working-pressure rating allowing for static pressure of borehole depth.

1. Increase pressure in 50-psig (345-kPa) increments and inspect each joint between increments. Hold at test pressure for 30 minutes. Slowly increase to next test pressure increment and hold for 30 minutes. After testing at maximum test pressure, reduce pressure to

30 psig (207 kPa). Hold for 90 minutes, and measure pressure at 30-minute intervals. Repair leaks and retest until no leaks exist.

C. Prepare reports of testing activity and submit to RE/COTR.

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